
Associations Between the Milk Mothers Drink and the Milk Consumed by Their School-Aged Children

Rachel K. Johnson, PhD, MPH, RD
The University of Vermont

Celeste V. Panely, MS, RD
The University of Vermont

Min Qi Wang, PhD
The University of Maryland

The declining milk intakes of U.S. children are of concern because milk is the primary source of calcium in children's diets. The aim of this study was to determine the predictors of milk consumption in U.S. school-aged children (ages 5-17) by using dietary intake data from the USDA 1994-95 Continuing Survey of Food Intakes by Individuals (CSFII). Sociodemographic variables, type of milk consumed (skim, 1%, 2%, whole, or none), and mothers' milk intake (type and amount) were examined as possible predictors. The sample consisted of 1,303 CSFII participants. Sample weights were applied to allow for generalizations to the entire U.S. school-aged population. Children's average milk intake was 300.4 grams per day. For every gram of milk a mother consumed, her child's intake increased by 0.64 grams. Two percent milk was the most commonly consumed milk among the children. For each type of milk consumed by mothers, children were at least 30 times more likely to drink that same type. The strong association between the milk consumed by mothers and the amount and type of milk consumed by U.S. school-aged children should be considered when designing intervention programs aimed at increasing children's milk intake.

Evidence suggests that attainment of peak bone mass by early adulthood may be the most effective protection against osteoporotic fractures later in life (23). Throughout the developmental years, adequate calcium intake is essential to support bone growth (16). Substantial evidence exists linking higher calcium intakes with improved skeletal health in children (2,3,16,21,23,30). Data from the U.S. Department of Agriculture's (USDA) nationwide food consumption surveys reveal that most U.S. school-aged children have calcium intakes that are below recommended levels (4).

Calcium intake is especially problematic for girls, with 59 percent ages 6-11 and 86 percent ages 12-18 not meeting recommendations (4).

Milk and dairy products are the primary source of calcium in children's diets (8). Johnson and colleagues found that in a large sample of school-aged children, on average, only those children who consumed milk at the noon meal met their daily requirement for calcium (15). Rising consumption of soft drinks has been shown to have a negative effect on calcium intake among children and adolescents by

competing with milk as a preferred beverage (9). On the other hand, whole and 2% milk are leading sources of fat and saturated fat in the diets of U.S. children (33). USDA food consumption survey data indicate that for children in all age groups, mean total and saturated fat intakes exceed the recommended levels (4).

Because milk is an important contributor of both calcium and fat in the diets of children, it is important to identify the predictors of children's milk intake (both type and amount). The aim of this study was to identify predictors of U.S. school-aged children's milk intake. Familial aggregation studies show similarities in nutrient intake between parents (especially mothers) and their children (26). Hence, milk consumption patterns of mothers were included, along with sociodemographic variables, in the research model as possible predictors of children's milk intake.

Findings from this study will assist nutrition policymakers, school nutrition personnel, school administrators, nutrition educators, and parents in developing appropriate intervention strategies to address the problem of children's declining milk consumption.

Methods

Sample

The research sample was obtained from the 1994-95 USDA Continuing Survey of Food Intakes by Individuals (CSFII). The CSFII is a continuing component of the USDA Nationwide Food Consumption Survey. The surveys provide data on demographics as well as dietary intake for a nationally representative sample of noninstitutionalized persons residing in the United States. The 1994-95 survey included data on the food and nutrient intakes of 5,598 individuals. The response rate of the

survey was 80 percent for Day 1 dietary intake data and 76 percent for Day 2 (4). These response rates are acceptable by research standards (7).

Trained interviewers used the multiple-pass 24-hour recall method to collect 2 days of dietary intake data from each respondent. The multiple-pass 24-hour recall method has been validated as an accurate measure of children's dietary intake (11). All children ages 5 to 17 years with 2 complete days of dietary intake data (N=1,303) and their mothers were included in this study.

Study Variables

The study investigated predictors of both the amount and type (skim, 1%, 2%, whole, or none) of milk consumed by U.S. school-aged children. The following sociodemographic variables were assessed as possible predictors: Child gender, age, and race; household income; geographic region; urbanization; and mother's age, education, and occupation. Participation in the USDA Food Stamp Program and participation in the USDA national school lunch and school breakfast programs were also included as possible predictors of a child's consumption of milk. Milk is required to be served in the national school lunch and school breakfast programs (5).

Mothers' milk consumption patterns (both type and amount) were included as potential predictors. A mother's nutrient intake has been shown to influence her child's nutrient intake (26). In addition, studies by Pelletier and colleagues indicated that among adult milk drinkers, consumption of lower fat versions of milk (1% and skim) was associated with increased average daily milk consumption (27). If the same is true for children, promotion of 1% and skim milk in this population could have a positive influence on calcium intake.

The dependent variables in the analysis were "Child Milk Amount" and "Child Milk Type." Child Milk Amount was defined as the 2-day mean intake in grams of fluid milk consumed by the sample child. The 7,250 food codes in the CSFII database were searched, and all codes whose primary ingredient was fluid cows' milk were included. Items such as flavored milk, evaporated milk, dry reconstituted milk, eggnog, and milk shakes were included. However, items such as flavored drinks (e.g., Yoo-hoo®), canned meal replacements (e.g., Instant Breakfast®), and infant formulas were excluded.

Child Milk Type was defined as the type of milk (skim, 1%, 2%, whole, or none) most often consumed by the sample child. The CSFII food codes were searched and all fluid milks were grouped into one of the four categories: Skim, 1%, 2%, or whole. For example: "milk, chocolate, skim milk based" was categorized as skim; "milk, dry, reconstituted, whole" was categorized as whole. The category consumed in the greatest quantity in grams over 2 days by each sample child was considered the Child Milk Type.

Statistical Analysis

The Statistical Export and Tabulation System (SETS) software and the Statistical Analysis System (SAS) were used to format and recode the data for statistical analysis. Statistical significance was set at $p < 0.05$ for all analyses. To compensate for variable probabilities of selection, differential nonresponse rates, and sampling frame considerations, we applied sample weights in both the descriptive and comparative analyses. The Survey Data Analysis System (SUDAAN) was used to weight the sample, compute variances, and run the statistical procedures. Applying sample weights allows the findings to be generalized to the entire U.S. population of school-aged children. Analysis of variance and analysis of

covariance were used to determine both the bivariate and multivariate effect of each independent variable on the dependent variable, Child Milk Amount. Only those independent variables that were significant at the bivariate level were included in the final multivariate model. Chi-square statistics were used to identify independent variables associated bivariate with Child Milk Type. The Multinomial Logistic Model was used for the multivariate analysis of Child Milk Type. As with the Child Milk Amount model, only those independent variables that were significant at the bivariate level were included in the multivariate model.¹

The results of the multinomial model were presented as odds ratios, which describe the change in likelihood of one outcome (e.g., drinking whole milk) versus another outcome (e.g., drinking 2% milk) given a particular characteristic or level of predictor (e.g., being a male compared with being a female) (31). In multinomial logistic models, each outcome (skim, 1%, whole, none) is compared with a reference category, which we determined to be 2% milk—the most common type of milk consumed. Odds ratios greater than 1.0 indicate an increased likelihood of consumption of that type of milk (compared with 2%) for children with that characteristic; whereas an odds ratio of less than 1.0 indicates a lower likelihood of consuming that type of milk (compared with 2%) for children with that characteristic. Both unadjusted and adjusted odds ratios were calculated.

¹The Multinomial Logistic Model is an extension of the logistic regression model. While logistic models can only process dichotomous outcome variables, the multinomial model can include outcomes with two or more categories (25).

Table 1. Amount and type of milk consumed¹ by children ages 5-17 who provided 2 days of dietary intake data, 1994-95 CSFII

Type of milk consumed	Percent	Mean amount (grams)
Skim	11.4	376.6 ²
1%	9.6	407.9
2%	32.0	385.4
Whole	28.4	347.8
None	18.6	0.0

¹Two-day mean intake of milk (grams/day)=300.4+11.9.

²There was no association between type (skim, 1%, 2%, whole) and amount of milk consumed. N=1,303.

This allows for the examination of the influence the independent variables have on the dependent variable (Child Milk Type) both before and after the model is adjusted for all the covariates. Any odds ratio with 95 percent confidence intervals that included 1.0 was not considered statistically significant.

Results

Demographics

The unweighted sample of CSFII respondents consisted of 1,303 participants. The children's average age was 11.6 years; the mothers', 39 years. Most of the sample was white, and was divided relatively equally between boys and girls. The sample was geographically diverse and representative of the U.S. population. Most participants resided in suburban areas, and the average yearly household income was about \$44,000. The mothers' most common classes of occupation included professional/technical and clerical/sales. Twenty-four percent of the children were eligible to receive free or reduced-price lunches, and 14 percent were eligible to receive free or reduced-price breakfasts.

Milk Consumption

The 2-day mean milk intake for children was 300.4 grams per day (table 1). Mothers' mean intake was 109.0 grams per day. Of the types of milk consumed by children (skim, 1%, 2%, whole, and none), 2% milk was most commonly consumed, followed by whole milk. Two percent milk was also the most commonly consumed type by mothers, followed closely by whole milk. No significant associations were found between the type (skim, 1%, 2%, or whole) and amount of milk consumed by children.

Predictors of the Amount of Milk Consumed by Children

Based on the bivariate analysis, the type and amount of milk consumed by mothers, geographic region, and the child's gender were associated with Child Milk Amount. Hence, these variables were entered into the multivariate model. In this model, the type of milk mothers consumed was not significant; however, geographic region, the child's gender, and the amount of milk mothers consumed each had a significant effect on the amount of milk consumed by children. In the multivariate analysis, children from the Midwest had significantly higher milk intakes than children from

For every 1 gram of milk a mother consumed, her child's intake increased by 0.64 grams.

Table 2. Amount of milk consumed by children ages 15-17: Analysis of covariance (ANCOVA)¹ of significant relationships, 1994-95 CSFII

Variable	Beta coefficient (±SE Beta)	P-value
Mothers' milk intake (milk type)		
Skim	1.94 ± 35.1	0.96
1%	28.3 ± 28.6	0.33
2%	4.3 ± 32.0	0.89
Whole	29.0 ± 31.7	0.37
None	0.00 ± 0.00	-
Mothers' milk intake (milk amount, grams)	0.64 ± 0.1	<0.001
Region		
Northeast	11.6 ± 26.9	0.66
Midwest	71.8 ± 35.6	0.05
West	49.3 ± 29.7	0.10
South	0.0 ± 0.0	-
Child's gender		
Male	120.0 ± 16.9	<0.001
Female	0.0 ± 0.0	-

¹F value for overall model = 137.07; P-value for model <.001; Intercept = 145.09.

- = No reference category.

N=1,303.

the South (table 2). Boys in the sample consumed 120 grams more milk per day than girls consumed. Maternal milk intake was significantly and positively associated with the amount of milk children consumed. For every 1 gram of milk a mother consumed, her child's intake increased by 0.64 grams.

Predictors of the Type of Milk Consumed by Children

Of the 12 independent variables, the children's age, gender, and race; geographic region; eligibility for free and reduced-price school lunch and breakfast; mothers' age and level of education; and the amount and type of milk consumed by mothers had a significant bivariate effect on Child Milk Type. Urbanization and participation in the Food Stamp Program were not significant predictors, and were therefore dropped from the multivariate model.

In the multivariate model, older children were more likely to drink skim milk or no milk than were younger children (table 3). Children who paid full price for lunch were more likely to drink skim milk, compared with children who were eligible to receive (and presumably received) free school lunch. Children from the Northeast were more likely than children from the South to drink 1% milk; whereas, children from the South were more likely than children from the Midwest to drink whole milk or no milk. Black children were more likely to drink whole milk or no milk than were White children. Girls were twice as likely to drink no milk, compared with boys.

The type of milk mothers drank was a very strong predictor of the type of milk children drank. Two percent milk was used as the reference category for Child Milk Type, because this was the type most commonly consumed by the

Table 3. Milk consumed by children ages 5-17: Results of unadjusted and adjusted odds ratios,¹ 1994-95 CSFII

	Skim			1%			Whole			None		
	Unadj OR ²	Adj OR	95% CI ³	Unadj OR	Adj OR	95% CI	Unadj OR	Adj OR	95% CI	Unadj OR	Adj OR	95% CI
CHILD												
Age (years)												
13-17	1.8	2.2	1.2, 3.9	0.7	1.2	0.6, 2.6	0.8	1.2	0.7, 2.1	3.8	3.9	2.2, 7.1
9-12	1.3	1.6	0.9, 2.9	0.7	0.9	0.4, 1.7	0.8	1.1	0.7, 1.7	1.0	1.0	0.5, 1.9
5-8	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Race												
Black	0.1	0.4	0.1, 1.2	0.1	0.5	0.2, 1.6	6.4	3.3	1.7, 6.4	3.2	3.0	1.2, 7.6
White	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Other	0.5	1.0	0.3, 3.8	0.7	0.4	0.1, 1.5	2.7	1.7	0.6, 4.6	0.8	1.3	0.4, 4.1
Gender												
Female	1.4	1.5	0.9, 2.7	0.9	1.2	0.7, 2.2	0.9	0.7	0.4, 1.1	2.1	2.1	1.1, 4.0
Male	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
School lunch												
None	1.3	1.0	0.4, 2.8	3.6	2.3	1.2, 4.4	1.2	0.9	0.5, 1.7	1.4	1.0	0.6, 1.9
Free	0.1	0.2	0.1, 0.4	1.1	1.3	0.3, 4.9	2.6	0.8	0.3, 2.6	0.6	0.3	0.1, 1.1
Reduced	0.4	1.2	0.2, 7.4	0.7	0.9	0.2, 4.6	2.0	1.4	0.4, 4.2	0.8	0.8	0.3, 2.4
Full	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
School breakfast												
None	2.7	2.8	0.5, 15.5	1.4	0.7	0.1, 4.2	3.0	3.9	0.8, 18.5	1.9	1.8	0.4, 8.6
Free	0.8	8.6	1.1, 69.8	1.0	1.9	0.2, 21	7.3	3.6	0.6, 23.9	1.8	3.4	0.4, 26.7
Reduced	0.0	0.4	0.1, 3.4	1.3	2.6	0.3, 27	7.9	3.1	0.4, 22.9	2.7	3.0	0.4, 21
Full	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
MOTHER												
Age (years)												
40-60	2.4	0.7	0.1, 3.9	2.1	1.7	0.4, 7.1	0.4	0.9	0.4, 2.2	2.7	1.2	0.4, 3.8
30-39	1.4	0.8	0.1, 4.5	2.3	2.8	0.7, 11	0.7	1.5	0.6, 3.9	1.4	1.0	0.3, 3.0
20-29	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Education												
College graduate	2.1	2.0	0.5, 8.0	3.6	2.5	0.9, 6.8	0.1	0.3	0.1, 0.7	1.2	1.3	0.4, 3.8
Some college	2.0	1.5	0.7, 3.1	2.2	1.6	0.8, 3.3	0.4	0.5	0.3, 0.8	0.8	0.8	0.4, 1.4
High school	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Type of milk consumed												
Skim	37.7	30.0	9.4, 95.8	3.2	3.7	1.1, 12	3.7	4.1	1.2, 14.6	4.5	4.3	1.4, 13
1%	4.3	4.7	0.8, 28.3	67.2	114	31, 416	5.2	8.2	2.6, 25.8	8.1	8.6	3.9, 19
Whole	4.6	5.9	1.5, 23.4	2.8	2.2	0.5, 8.5	50.1	45.8	17.1, 122.8	7.4	5.9	1.8, 19
None	7.2	7.2	2.0, 26.1	3.1	4.2	1.2, 15	10.8	13.0	6.0, 28.1	6.9	3.8	1.6, 9.2
2%	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
Amount of milk consumed (grams)												
>360	1.0	0.9	0.2, 3.2	1.6	1.3	0.3, 6.0	1.0	2.0	0.8, 5.1	0.4	0.7	0.3, 2.0
241-360	1.9	1.4	0.5, 4.3	1.8	2.8	0.6, 12	1.3	1.4	0.4, 4.3	0.2	0.3	0.1, 1.1
121-240	0.6	0.6	0.1, 2.4	0.9	1.0	0.3, 2.8	0.5	0.9	0.4, 2.3	0.3	0.5	0.2, 1.3
0-120	1.0	1.0	0	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–
REGION												
Northeast	1.3	1.5	0.7, 3.2	4.5	5.5	1.3, 23	1.1	1.1	0.4, 2.8	0.8	0.9	0.4, 2.1
Midwest	0.6	0.8	0.3, 2.0	0.8	0.9	0.2, 3.3	0.3	0.4	0.2, 0.7	0.3	0.4	0.2, 0.8
West	0.7	1.0	0.4, 2.2	2.0	4.0	1.0, 16	0.7	0.5	0.2, 1.3	0.5	0.7	0.3, 1.7
South	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–	1.0	1.0	–

¹Consumption of skim, 1%, whole, or no milk is compared to 2% milk, as 2% is the most commonly consumed milk type among both sample children and mothers. Odds ratios whose confidence limits do not include 1.0 are bolded.

²Odds ratios.

³Confidence intervals.

– = No reference category.

N=1,303.

For each type of milk . . . consumed by mothers, children were at least 30 times more likely to drink the same milk type as their mothers.

sample. For each type of milk (skim, 1%, whole, or none) consumed by mothers, children were at least 30 times more likely to drink the same milk type as their mothers. In addition, the more educated a mother was, the less likely her child was to drink whole milk.

The odds ratios for school breakfast, mother milk amount, and mothers' age were not significant; the 95 percent confidence intervals for these variables included or were very close to 1.0.

Discussion

The findings of this study demonstrated that the amount and type of milk consumed by mothers strongly predicted the amount and type of milk consumed by their school-aged children. This study also demonstrated that differences in children's milk consumption patterns were associated with a number of demographic variables. These included regional differences; differences associated with mothers' level of education; and children's age, gender, and race.

Limitations

The problem of underreporting of food intake is a concern when interpreting dietary intake data (24). When food consumption surveys are used to obtain dietary intake data, both adults and adolescents tend to underreport their food intake (22). However, there is agreement that individuals of all ages are prone to exaggerate those foods they perceive to be healthful and to underreport foods that are commonly considered "sin" foods (i.e., foods high in sugar and fat) (22). Milk is generally perceived as a healthful food and was not among those foods most likely to be underreported in the CSFII (18). Hence underreporting was not likely to be a significant problem in this study.

Factors Influencing the Amount of Milk Consumed by U.S. School-Aged Children

The amount of milk consumed by mothers was associated strongly and positively with the amount of milk consumed by their children. Parents guide and direct children's food choices (17). Wardle and colleagues studied parental influences on children's consumption patterns and found significant mother-child correlations for consumption of dietary fat as well as fruit and vegetable consumption (34). Harper and Sanders observed that children sample unfamiliar food consistently more often when they view their parents partaking of the food (10). Children whose mothers do not drink milk may be less likely to sample milk, perceiving milk as an unfamiliar food.

Parental monitoring may also influence children's milk consumption. Research has shown that parental monitoring can have a marked effect on children's food selection (17). Researchers interviewed over 50 focus groups with children nationwide regarding the factors that influence their consumption of calcium-rich foods. They discovered that a large percentage of children were neither encouraged nor required by their parents to drink milk at home (36).

In our study, other predictors of the amount of milk consumed by U.S. school-aged children included children's gender and region. Compared with the girls, the boys consumed an average of 128 grams per day more milk. This is an important finding, because girls' calcium intakes are also lower than boys' (4). Girls' energy needs are typically lower than boys'. These lower energy needs may be reflected in lower intakes of all foods and beverages, including milk. On the

other hand, it is possible that some girls may be restricting their food intake and eliminating or reducing their milk intake to cut calories and fat. Girls may initiate dieting behaviors as early as age 6. In one Ohio study of school-children Grades 1 through 5, close to twice as many girls as boys reported restricting or altering their food intake (1). Adequate calcium intake is especially important for girls—being female is an independent risk factor for developing osteoporosis (8).

In our study, differences found in children's milk intake by region of residence are also important. Southern girls have the lowest calcium intakes, compared with girls in other regions (12). This study determined that children in the South also have the lowest milk intakes. In addition, they were more likely than children from other regions to drink no milk at all. Increased milk consumption among children in the South could be influential in improving their calcium intakes.

Race did not predict the amount of milk consumed. Lactose maldigestion appears to vary widely among different ethnic and racial groups and in the United States is estimated to be about 15 percent in Whites, 80 percent in African Americans, and 90 percent in Asian Americans (19). However, a dairy-rich diet was found to be well tolerated when fed to African-American adolescent girls for 21 days (29). In this study race did not influence total milk intake. This is consistent with findings that most people with lactose maldigestion are able to tolerate a glass of milk at a meal without developing any significant symptoms (32).

Factors Influencing the Type of Milk Consumed by U.S. School-Aged Children

The results of this study also demonstrated that a variety of factors influenced the type (skim, 2%, 1%, whole, none) of milk consumed by U.S. school-aged children. The type of milk consumed by the mothers was associated strongly with the type of milk consumed by their children. This finding was consistent with results of studies conducted by Fischer and Birch, demonstrating that exposure to a food over time will result in the development of a preference for the food among children (6). Children who have continued exposure to 1% and skim milk in the home and who observe their mothers consuming these types of milk are likely also to drink these types of milk. The type of milk consumed by children can have an effect on total diet quality. Children who drink skim milk come closer to meeting dietary recommendations for fat and saturated fat in their total daily diet (15,28). Individuals in all age groups who consume 1% and skim milk also consume more fruits and vegetables and less red meat (20).

On the other hand, the cross-sectional nature of these data make it difficult to sort out the directionality of the association between the type of milk consumed by mothers and the type consumed by their children. Thus, it is possible that mothers may simply drink the type of milk their children like, and if the children do not like milk, mothers may not buy it just for themselves.

Prior studies have shown that mothers' education level is correlated with their children's nutrient intake (13). In our

study, mothers with the fewest years of education were more likely to have children who drank whole milk or no milk at all, compared with mothers who were more highly educated. Nutrition information may not be reaching less educated mothers. It is also possible that 1% and skim milk are not as accessible to them. Whole milk is sometimes the only choice available in lower income communities (35).

Children from the South (compared with those in other regions) as well as black children (compared with white children) were more likely to drink whole milk or no milk at all. It may be necessary to target the Southern United States for outreach, because children in the South have the highest fat and saturated fat intakes and the lowest calcium intakes of children in all regions in the United States (14).

Several other variables were associated with the type of milk consumed by school-aged children. Older children and girls were more likely to drink skim milk than were younger children and boys, respectively. Findings also showed that children eligible to receive free school lunch were less likely to drink skim milk than were children who paid full price. Beginning in the fall of 1996, schools participating in USDA school nutrition programs were required by law to serve meals that on average meet the dietary guidelines for fat, saturated fat, cholesterol, and sodium (5). Because it is difficult to meet the dietary guidelines when a meal includes whole milk (15), participating schools may now be serving and marketing 1% and skim milk more vigorously. Further research using future USDA surveys is needed to confirm this possibility.

Implications

The findings of our study demonstrate that mothers' milk consumption patterns are potentially strongly associated with the type and amount of milk consumed by U.S. school-aged children. Interventions aimed at increasing children's milk consumption should consider the strong influence of maternal modeling on children's milk intake. Mothers should be encouraged to serve as positive role models for their children by drinking skim or 1% milk regularly. In addition, it becomes apparent that milk promotion campaigns targeting women for prevention of osteoporosis may have a spillover effect of increasing children's milk consumption.

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References

1. Berg, F.M. 1997. *Afraid to Eat; Children and Teens in Weight Crisis* (2nd ed.). Healthy Weight Publishing Network, Hettinger, North Dakota.
2. Cadogan, J., Eastell, R., and Jones, N. 1997. Milk intake and bone mineral acquisition in adolescent girls: Randomized, controlled intervention trial. *BMJ* 15:1255-1260.
3. Chan, G.M., Hoffman, K., and McMurtry, M. 1995. Effects of dairy products on bone and body composition in pubertal girls. *Journal of Pediatrics* 126:551-556.
4. Continuing Survey of Food Intakes by Individuals (CSFII), 1994-95 data set descriptions and data tables: Combined results of the USDA's 1994-95 CSFII. ARS Beltsville Human Nutrition Research Center, Food Surveys Research Group, 1996.
5. Eadie, R.E. 1995. Child nutrition programs: School meal initiatives for healthy children; final rule. *Federal Register* 60(113):31188-31222.
6. Fischer, J.O. and Birch, L.L. 1995. Fat preferences and fat consumption of 3-5 year-old children are related to parental adiposity. *Journal of the American Dietetic Association* 95:759-764.
7. Fowler, F.J. 1990. *Survey Research Methods. Applied Social Research Methods Series*, Volume 1. Sage Publications, Newbury Park, CA.
8. Guthrie, H.A. and Picciano, M.F. 1995. *Human Nutrition*. Mosby, Boston.
9. Harnack, L., Stang, J., and Story, M. 1999. Soft drink consumption among U.S. children and adolescents: Nutritional consequences. *Journal of the American Dietetic Association* 99:436-441.
10. Harper, L.V. and Sanders, K.M. 1975. The effects of adults on young children's acceptance of unfamiliar foods. *Journal of Experimental Child Psychology* 20:206-214.
11. Johnson, R.K., Driscoll, P., and Goran, M.I. 1996. Comparison of multiple-pass 24-hour recall estimates of energy intake with total energy expenditure determined by the doubly labeled water method in young children. *Journal of the American Dietetic Association* 96:1140-1144.
12. Johnson, R.K., Guthrie, H., and Smiciklas-Wright, H. 1994. Characterizing nutrient intakes of children by sociodemographic factors. *Public Health Reports* 109(3):414-420.
13. Johnson, R.K., Johnson, D., Harvey, J., and Wang, M. 1994. Dietary quality of the noon-time meal among a large sample of U.S. adolescents. *School Food Service Research Review* 18(1):2-7.
14. Johnson, R.K., Johnson, D., Wang, M., Smiciklas-Wright, H., and Guthrie, H. 1994. Characterizing nutrient intakes of adolescents by sociodemographic variables. *Journal of Adolescent Health* 15:149-154.
15. Johnson, R.K., Panely, C.V., and Wang, M.Q. 1998. The association between noon-time beverage consumption and the diet quality of school-aged children. *Journal of Child Nutrition and Management* 22(2):95-100.
16. Johnston, C.C., Miller, J.Z., Slemenda, D.W., Reister, T.K., Hui, S., Christian, J.C., and Peacock, M. 1992. Calcium supplementation and increases in bone mineral density in children. *The New England Journal of Medicine* 327:82-87.

-
17. Klesges, R.C., Stein, R.J., and Eck, L.H. 1991. Parental influence on food selection in young children and its relationship to childhood obesity. *The American Journal of Clinical Nutrition* 53:859-864.
18. Krebs-Smith, S.M., Graubard, B., Cleveland, L., Subar, A., Ballard-Barbash, R., and Kahle, L. 2000. Low energy reporters vs others: A comparison of reported food intakes. *European Journal of Clinical Nutrition* 54:281-287.
19. *Lactose Intolerance*. 1994. National Digestive Diseases Information Clearinghouse, Washington, DC. National Institutes of Health publication 94-2751.
20. Lee, H.C., Gerrior, S.A., and Smith, J.A. 1998. Energy, macronutrient and food intakes in relation to energy compensation in consumers who drink different types of milk. *The American Journal of Clinical Nutrition* 67:616-623.
21. Lee, W., Leung, S., and Wang, S.H. 1994. Double-blind, controlled calcium supplementation and bone mineral accretion in children accustomed to a low calcium diet. *The American Journal of Clinical Nutrition* 60:744-750.
22. Livingstone, M.B., Prentice, A.M., and Coward, W.A. 1992. Validation of estimates of energy intake by weighted dietary record and diet history in children and adolescents. *The American Journal of Clinical Nutrition* 56:29-35.
23. Lloyd, T., Andon, M.B., and Rollings, N. 1993. Calcium supplementation and bone mineral density in adolescent girls. *JAMA* 270(7):841-844.
24. Mertz, W., Tsui, J.C., and Judd, J.T. 1991. What are people really eating? The relation between energy intake derived from estimated diet records and intake determined to maintain body weight. *The American Journal of Clinical Nutrition* 54:28-35.
25. Morel, J.G. 1989. Logistic regression under complex survey designs. *Survey Methodology* 15:203-223.
26. Oliveria, S.A., Ellison, R.C., and Moore, L.L. 1992. Parent-child relationships in nutrient intake: The Framingham Children's Study. *The American Journal of Clinical Nutrition* 56:593-598.
27. Pelletier, D.L., Kendall, A., and Mathios, A. 1996. Lowfat milk promotion: Opportunities created by a new policy environment. Unpublished work, pp. 1-25. Cornell University, Ithaca, NY.
28. Peterson, S. and Sigman-Grant, M. 1997. Impact of adopting lower-fat food choices on nutrient intake of American children. *Pediatrics* 100(3):A380.
29. Pribila, B., Hertzler, S.R., Martin, B.R., Weaver, C.M., and Savaiano, D.A. 2000. Improved lactose digestion and intolerance among African-American adolescent girls fed a dairy-rich diet. *Journal of the American Dietetic Association* 100:524-528.
30. Sentipal, J.M., Wardlaw, G.M., and Mahan, J. 1991. Influence of calcium intake and growth indexes on vertebral bone mineral density in young females. *The American Journal of Clinical Nutrition* 54:425-428.
31. Shah, B.V., Barnwell, B.G., and Bieler, G.S. 1997. SUDAAN Software for the Statistical Analysis of Correlated Data. User's Manual. Research Triangle Institute, NC.
32. Suarez, F.L., Savaiano, D.A., and Levitt, M.D. 1995. A comparison of symptoms after the consumption of milk or lactose-hydrolyzed milk by people with self-reported severe lactose intolerance. *The New England Journal of Medicine* 333:1-4.

-
33. Thompson, F.E. and Dennison, B.A. 1994. Dietary sources of fats and cholesterol in U.S. children aged 2 through 5 years. *American Journal of Public Health* 84:779-806.
34. Wardle, J., Gibson, L., and Watts, C. 1995. Parental influences on children's nutritional knowledge, diet and risk factor status. *Annals of Behavioral Medicine* PA16A, SO79.
35. Wechsler, H., Basch, C.E., Zybert, P., Lantigua, R., and Shea, S. 1995. The availability of low-fat milk in an inner-city Latino community: Implications for nutrition education. *American Journal of Public Health* 85(12):1690-1692.
36. Wolfe, F.H. Factors influencing the intake of calcium rich foods among adolescents. [On-line]. Available: <http://cristel.nal.usda.regional.linkpage>. Accessed December 13, 1999.